THE INVENTION CLAIMED IS

1. A system comprising:

a transceiver constructed to transmit an interrogating beam;

a communication station capable of receiving said interrogating beam; and

said communication station having a plurality of phase conjugators arranged in an array.

2. The system of claim 1 further comprising:

said communication station capable of transmitting an encoded phase conjugate beam to said transceiver from said plurality of phase conjugators.

3. The system of claim 1, wherein said communication station is configured to respond to said interrogating beam by encoding data into phase conjugate beam in the plurality of semiconductor laser diodes and pumping the encoded phase conjugate beam by intracavity nondegenerate four wave mixing.

4. The system of claim 3, wherein said encoding of said phase conjugate beam is accomplished at rates exceeding approximately 1 kiloHertz.

5. The system of claim 3, wherein said encoding of said phase conjugated beam is accomplished at rates in the range of approximately 1GHz to approximately 10 GHz.

6. The system of claim 1, wherein said plurality of phase conjugators are arranged in a substantially linear array.

7. The system of claim 1, wherein said plurality of phase conjugators substantially spaced apart.

8. The system of claim 1, wherein said plurality of phase conjugators are single gain stripe devices.

9. The system of claim 1, wherein said plurality of phase conjugators number at least four.

10. The system of claim 1, wherein the apertures of the plurality of phase conjugators are sufficient to resolve a substantial portion of the spatial components of the input wavefront of the interrogating beam.

11. The system of claim 1, wherein the apertures of the plurality of phase conjugators are sufficient to resolve greater than approximately 80% of the spatial components of the input wavefront of the interrogating beam.

12. The system of claim 1, wherein the communication station does not have a movable part pointing and tracking system.

13. The system of claim 1, wherein the plurality of phase conjugators each have a top electrode with an aperture.

14. The system of claim 1, wherein the interrogating beam interacts with pump beams operating in the plurality of phase conjugators at a substantially transverse angle.

15. The system of claim 1, wherein the interrogating beam interacts with pump beams operating in the plurality of phase conjugators in a substantially parallel manner.

16. The system of claim 1, wherein the transceiver is mounted on one of the group consisting of a UAV, airplane, HALE, satellite, ground station, and an automobile.

17. The system of claim 1, wherein the communication station is mounted on one of the group consisting of a UAV, airplane, HALE, satellite, ground station, and an automobile.

18. A system comprising:

a transceiver constructed to transmit an interrogating beam;

a communication station capable of receiving said interrogating beam; and

said communication station having a phase conjugator with a top electrode, wherein an aperture is located in said top electrode.

19. The system of claim 18, wherein the interrogating beam interacts with at least one pump beam operating in the phase conjugator at a substantially transverse angle.

20. The system of claim 18, wherein the phase conjugator is a broad–area, distributed feedback laser device.

21. The system of claim 18, wherein the aperture is greater than 10 microns.

22. A system comprising:

a transceiver constructed to transmit an interrogating beam;

a communication station capable of receiving said interrogating beam; and

said communication station having a phase conjugator which is a VCSEL.

23. The system of claim 22, wherein the interrogating beam interacts with at least one pump beam operating in the phase conjugator in a substantially parallel manner.

24. An optical interconnection system comprising:

a fiber optic device constructed to transmit an interrogating beam; and

a micro-mirror adapted to receive said interrogating beam and transmit the beam to a predetermined phase conjugator.

25. The system of claim 24, wherein said phase conjugator is a VCSEL.

26. The system of claim 24, wherein said interrogating beam interacts with at least one pump beams operating in the phase conjugator in a substantially parallel manner.

27. The system of claim 24, wherein said phase conjugator has a top electrode with an aperture.

28. The system of claim 24, wherein the phase conjugator is a broad-area, distributed feedback laser device.

29. The system of claim 24, wherein the interrogating beam interacts with at least one pump beam operating in the phase conjugator at a transverse angle.

30. The system of claim 24, wherein said predetermined phase conjugator is one of a plurality of phase conjugators arranged in an array.

31. The system of claim 24, wherein said predetermined phase conjugator is one of a plurality of phase conjugators arranged in a first array of a plurality of arrays of phase conjugators.

32. The system of claim 30, wherein the plurality of phase conjugators are single gain stripe devices.

33. The system of claim 30, wherein the plurality of phase conjugators have apertures located in a top electrode.

34. A system comprising:

a means for transmitting and receiving an interrogating beam;

a communication station operatively coupled to said transmitting means and having a means for returning a phase conjugate beam to said transmitting and receiving means.

35. A method comprising:

transmitting an interrogating beam from a transceiver;

receiving said interrogating beam at a communication station;

encoding data onto a phase conjugate beam data and pumping the encoded phase conjugate reflectivity by nondegenerate four wave mixing; and

transmitting the encoded phase conjugate beam back to the transceiver.

36. A method comprising:

transmitting an interrogating beam from a transceiver;

receiving said interrogating beam at an array of phase conjugators;

modulating data onto a phase conjugate beam; and

transmitting the phase conjugate beam to said transceiver.

37. The method of claim 36, further comprising:

collecting data through a sensor located in proximity to said phase conjugators and transmitting said data to said phase conjugators.

38. The method of claim 36, wherein said interrogating beam interacts with at least on pump beam operating in each of said phase conjugators in a substantially parallel manner.

39. The method of claim 36, wherein said interrogating beam interacts with at least on pump beam operating in each of said phase conjugators in a substantially transverse manner.

40. A method comprising:

transmitting an interrogating beam from a transceiver;

receiving said interrogating beam at an array of phase conjugators through apertures located in the top electrodes of the phase conjugators;

modulating data onto a phase conjugate beam; and

transmitting the phase conjugate beam to said transceiver.

41. A method comprising:

transmitting an interrogating beam from a transceiver;

receiving said interrogating beam at an array of phase conjugators and resolving a substantial portion of the spatial components of the input wavefront of the interrogating beam;

modulating data onto a phase conjugate beam; and

transmitting the phase conjugate beam to said transceiver.

42. A method of providing an optical interconnect comprising:

transmitting an interrogating beam from a fiber optic device;

receiving said interrogating beam at a micro-mirror across free space;

transmitting a second beam from micro-mirror to a predetermined phase conjugator.

43. The method of claim 42,

modulating data onto said second beam at said predetermined phase conjugator;

transmitting an encoded phase conjugated beam to said micro-mirror.

44. The method of claim 43, transmitting a third beam from said micro-mirror to said fiber optic device.